


# 生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	共生藻類提供光合作用產物 (Symbiotic algae provide photosynthetic products)
生物系統 LIVING SYSTEM	斑點鈍口螈 <i>Ambystoma maculatum</i> (Spotted salamander)
功能類別 FUNCTIONS	#獲得、吸收、或過濾生物 #獲得、吸收、或過濾能量 #獲得、吸收、或過濾氣體 #不同物種之間合作/競爭 #Capture, Absorb, or Filter Organisms #Capture, Absorb, or Filter Gases #Capture, Absorb, or Filter Energy # Cooperate/Compete Between Different Species
作用機制標題	被包裹在斑點鈍口螈細胞內的藻類，可能透過內部共生作用提供光合作用產物（氧氣和碳水化合物） [Algae encapsulated in cells of spotted salamander may provide photosynthetic products (oxygen and carbohydrate) by internal symbiosis.]
生物系統/作用機制 示意圖	
作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)	
文獻引用 (REFERENCES)	
<p>「單細胞的藻類 <i>Oophila amblystomatis</i>，長期以來被認為與會產卵於水體中的斑點鈍口螈 (spotted salamander) 具有共生關係 (symbiotic relationship)。然而，共生作用被認為發生於螈卵與其外部的藻類之間—胚胎產生富含氮素的廢物對藻類有用，而藻類則增加了呼吸中胚胎周圍水域的氧氣含量。」</p> <p>「7月28日於烏拉圭埃斯特角城 (Punta del Este) 舉辦的第九屆國際脊椎動物形態學研討會演講中，來自加拿大新斯科舍省 (Nova Scotia) 哈利法克斯 (Halifax) 達爾豪斯大學 (Dalhousie University) 的Ryan Kerney報告，這些藻類實際上普遍地分佈在斑點螈全身的細胞內。此外，有跡象表明細胞內藻類可能直接地提供光合作用產物（氧氣和碳水化合物）給包裹著它們的螈細胞，因為脊椎動物細胞具有所謂的適應性免疫系統 (adaptive immune system)(會破壞不被認為是「自己」的生物材料 (biological material))，因此認為共生</p>	

體 (symbiont) 不可能穩定地在蝾螈體內生存。但在此個案之中，斑點鈍口螈細胞可能關閉了其內部免疫系統，或是藻類以某種方式繞過了它。」 (Petherick 2010: 1)

“The single-celled alga *Oophila amblystomatis*... has long been understood to enjoy a symbiotic relationship with the spotted salamander, which lays its eggs in bodies of water. However, the symbiosis was thought to occur between the salamander embryo and algae living outside it — with the embryo producing nitrogen-rich waste that is useful to algae, and the algae increasing the oxygen content of the water in the immediate vicinity of the respiring embryos.”

“At a presentation on 28 July at the Ninth International Congress of Vertebrate Morphology in Punta del Este, Uruguay, Ryan Kerney of Dalhousie University in Halifax, Nova Scotia, Canada, reported that these algae are, in fact, commonly located inside cells all over the spotted salamander’s body. Moreover, there are signs that intracellular algae may be directly providing the products of photosynthesis — oxygen and carbohydrate — to the salamander cells that encapsulate them ... Because vertebrate cells have what is known as an adaptive immune system — which destroys biological material not considered ‘self’ — it was thought to be impossible for a symbiont to live stably inside them. But, in this case, the salamander cells have either turned their internal immune system off, or the algae have somehow bypassed it.” (Petherick 2010: 1)

#### 參考文獻清單與連結 (REFERENCE LIST)

延伸閱讀: **Harvard** 或 **APA** 格式

生物系統延伸資訊連結 (LEARN MORE ABOUT THE LIVING SYSTEM/S)

<https://asknature.org/system/amphibians?post-type=Biological%20Strategies>

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